

3742

PTO/SB/21 (03-03)

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Application Number

09/939,144

Filing Date

8/27/01

First Named Inventor

MARK ATKINS

Art Unit

3742

Examiner Name

CAMPBELL, THOR S.

Attorney Docket Number

Total Number of Pages in This Submission

7

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ENCLOSURES (Check all that apply)

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872-9302



1st Response To Patent Examiner – Inkwell Products, Inc
By: Mark Atkins

4-18-03

#5
Duplicate

Dear Mr. Campbell.

Below I have responded to your comments about our patent application. The first two sections contrast our patent application to the two patents you noted. The third section discusses the intended protection of our claims and revised claims.

Please call me after you have had a chance to review (630) 677-9233

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Patent #4,756,091 – Herbert Van Denend

Arguments as to why our design is novel to this patent:

The Van Denend patent describes a hybrid oven that uses an infra-red heat element and high velocity heated air to heat the substrate.

Van Denend incorporates a heating element for the purpose of emitting infra-red radiation as a means of energy transfer to the substrate being dried. The nature of this process differs substantially from Inkwell Products applications where the heat energy is first passed to an air stream moving past a specially designed heat exchanger. The air stream is then impinged upon the substrate being dried where it then transfers its stored heat energy for the process of drying. The heat element described by Van Denend, although similar in construction to the heating element described in Inkwell Product's application, incorporates different materials such as quartz tubes versus stainless steel sheaths to maximize the efficiency of radiating infra-red energy.

In Van Denend's design, the infra-red-heating element is located immediately above the substrate and radiates infra-red energy onto the web. The temperature of the element is at a substantially higher temperature than both the oven and the web temperature as noted in Patent 4,756,091 Column 5 lines 55-60. The substantial difference in the element's surface temperature raises substrate temperature quickly as it passes by thermal radiation. Processes in the printing and coating industries use either water-based or solvent-based inks and/or coatings. Since the heat source in Van Denend's design is exposed to the environment, this technology is limited to non-hazardous environments only (i.e. water based processes).

In comparison, the Inkwell Products design has the heating element buried in the middle of the air distribution system, therefore heat cannot radiate directly from the heating element to the web. In operation, the bottom surface of the air distribution system heats up to approximately equal that of the temperature of the oven. Energy transfer via thermal radiation is factually insignificant to the invention and drying process. Since the heat source is located within the air distribution system and air is always being project

outward, the device is considered to be in a sealed pressurized vessel and therefore can be operated in hazardous environments.

In Van Denend's design, the high velocity heated air is preheated by a remote gas burner, then gathered in a remote plenum, and then travels through ductwork where it eventually is dispersed onto the web. A blower moves the heated air through this system. This system is made up of large and bulky components that take up a lot of floor space and that are expensive to both fabricate and install. The system is also not very efficient in operation for two reasons. First because the heated air travels such a long distance before it is impinged onto the substrate. Secondly, it is well known that large volumes of air are required to for the system to achieve an acceptable level of drying.

In comparison, the InkWell Products technology is very compact and efficient in that the air is heated just prior to being dispersed onto the web. The air distribution system is internally designed so that the air runs through a maze of air passages and consequently continues to increase in temperature as it moves toward the discharge orifices. All this is accomplished in a single compact assembly that can be treated as a single component (i.e. the air distribution system). Since this system is all-inclusive in a single component, it lends it self to being modularized and for applications where space is limited.

Also in comparison, the Inkwell Products system uses air that is supplied by an air compressor not a blower. Two benefits are received by using compressed air. First, much higher impinging velocities of the heated air on the substrate are achieved. It has been shown that when using compressed air, the air exiting the air distribution system is at sonic velocity (65,000 to 85,000 feet per minute), which is substantially higher velocity than Van Denend's can achieve using a blower – shown to be limited to approximately 10,000 to 12,000 feet per minute. This extra high velocity air significantly increases the heat transfer coefficient for convection, thus allowing the heat to enter the substrate at a much higher rate. Since the air is passing through very small round orifices instead of slots, less air volume is consumed thereby making this invention an economically viable process. Secondly, the process of compressing the air removes moisture thus it more readily absorbs the moisture being driven out of the substrate. On average, the combinations of these benefits have proven to increase press line speeds by 40%.

Patent #5,937,535 – Hoffman Jr.

Generally speaking, Hoffman never specifically discusses the means for heating the substrate within his dryer. Hoffman seems to be primarily focused on using sensors appropriately to achieve a consistent drying environment in an oven, whereas the InkWell Products patent application focuses on the technology that accomplishes the actual drying. Hoffman does not discuss heat source, airflow, type of heat transfer (i.e. convection, conduction, IR), etc.

In reference to your comment:

“Hoffman Jr. et al. discloses a forced air drying unit comprising a housing, an inlet cavity, a baffle, air passages, a single or multiple orifice chamber, and a series of orifices allowing air to pass from said orifice chamber to the exterior of the housing, an electrical cartridge heater mounted within the housing, and having a means for controlling the temperature of the material comprising thermocouple.”

Hoffman may have some or all of these components in his design, as does Van Denend, but uses them in a substantially different way. In the referenced designs, these components are of sheet metal construction and make up the overall construction of the dryer in which the substrate passes through, whereas as in our design, the similar components make up only the “nozzle” of the dryer.

Our design uses orifices, whereas Hoffman describes his system with “air knives (with slits therein).” Since he is using slits and not orifices, he is pushing substantially more volume of air through his system, which means he is also using a blower not compressed air. Same argument for the blower applies from Van Denend patent above.

Hoffman discusses a humidifier, chiller, conveyor, air purging system, and ductwork. Our design does not use any of these components.

I have specifically commented below for each of Hoffman’s claims in comparison to our design.

Claim #1 – We do not claim a conveyor or multiple sensors within the oven/dryer. Our design only uses a single temperature sensor to provide a means for controlling temperate. The terms “entrance” an “exit” refer to an openings in the dryer housing for which the substrate may pass through, not opening is the “nozzle”. We do not claim a dryer entrance and/or exit openings.

Claim #2 to #4 – Hoffman claims an infra-red sensor, whereas we use a thermocouple that senses temperature through means of conduction.

Claim #5 – We do not claim an air purging of any type, especially in relation to the sensor.

Claim #6 & #7 – Hoffman’s patent describes a housing for the sensor. We do not have such a housing. Our sensor is mounted directly to a flat plate.

Claim #8 - Once again, we do not claim a conveyor or multiple sensors within the oven/dryer. Our technology uses a single temperature sensor to provide a means for controlling the air discharge temperature. The "entrance" and "exit" refer to an openings in the dryer housing for which the substrate may pass through. I do not claim a dryer entrance and/or exit.

Claim #9 to #11 – Hoffman discusses the infra-red sensor and appropriate mounting. We do not use an infra-red sensor.

Claim #12 to #16 – Hoffman discusses a dehumidifier as a component of the system. We do not have this component.

Claim #17 – Hoffman discusses spacing and locations of multiple sensors. Once again, we only have one sensor.

Claim #18 & #19 – Same arguments as above

InkWell Products Claims

Brief discussion on the intended protection of our claims:

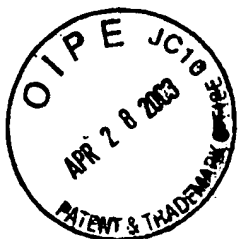
- Claim #1 - Protect the novelty of the air distribution system. The term “air distribution system” is used as a generalize term for a nozzle.
- Claim #2 – The intention of this claim was to protect our ability to package the entire dryer and all dryer components into a single enclosure. Due to the limited amount of space available in applications, this was not possible until the development of the compact air distribution system described in claim #1 or claim #6.

Some advantages:

- Portability/Mobility – can easily be moved to another location in the plant where more drying is needed.
 - Operator efficiencies - controls are right at the point use
 - Does not take up additional plant floor space
 - Cost savings in manufacturing the dryer (i.e. shorter wires/cables, control enclosures, etc.)
 - Easier to mount – Just mount the dryer. Do not have to additionally mount control boxes and run cables.
-
- Claim #3 – Placement and usage of a temperature feed back sensor.
 - Claim #4 – Generalize the heat source for the invention
 - Claim #5 – Removed
 - Claim #6 – was added to protect against someone making an inexpensive “knock off” of our design by simply putting a heat source in a “nozzle”.

CLAIMS (Revised)

1. An air distribution system for a forced hot air drying unit for drying inks, paints or coatings comprising of:
a housing, an inlet cavity, a baffle, air passages, a single or multiple orifice chamber(s), and a series of orifices allowing air to pass from the said orifice chamber(s) to the exterior of the said housing of the said air distribution system
an internal construction capable of accepting an electrical heater which allows heat to be efficiently conveyed from the said electrical heater through the said internal construction to the air as the air passes from the said baffle to the said orifices.
a said electrical heater mounted within the said internal construction of the said housing of the said air distribution system
2. A forced hot air drying unit for drying inks, paints and coatings where all dryer components are located in a single enclosure comprising of:
a means for receiving pressurized air
a means for receiving electrical power
single or multiple air distribution system(s) that receive, heat, and disperse the said pressurized air
a means of controlling the flow of the said pressurized air passing through the said air distribution system(s), the preferred controlling means includes an air flow regulator.
a means of controlling the temperature of the air passing through the said air distribution system(s), the preferred means includes a modulating power electronic temperature controller.
3. A means of monitoring the effective temperature of a forced hot air drying unit for drying inks, paints or coatings comprising of:
a thermocouple mounted to a thermal conducting slide plate in contact or supporting the materials being dried.
the thermocouple mounted in a location where the material being dried has already been exposed to the majority of the resident time of the drying unit.
the thermocouple being capable of attaining the temperature of the material being dried.
4. The dryer of claim 1 in which said heater comprises of a solid cartridge type heater that may vary in material composition, diameter, length and wattage.
5. Removed
6. An air distribution system for a forced hot air drying unit for drying inks, paints or coatings comprising of:
a housing with an air inlet port to allow air to enter the said housing, an internal cavity, and orifices to allow air to pass from the said internal cavity to the exterior of the said housing
a heater mounted within the said internal cavity of the said housing



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Application Number	09/939,144
Filing Date	8/27/01
First Named Inventor	MARK ATKINS
Art Unit	3742
Examiner Name	CAMPBELL, THOR S.
Attorney Docket Number	
Total Number of Pages in This Submission	7

ENCLOSURES (Check all that apply)		
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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/594,968	10/29/2002	6471773	1484.00001	9813
7590	10/10/2002			

Mark R Atkins
W 674 Privet Court
St Charles, IL 60175

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)**

The patent term adjustment is 0 day(s), and will be printed on the front page of the patent.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) system. (<http://pair.uspto.gov>)

APPLICANT(S):

Mark R. Atkins, Glen Ellyn, IL;

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DETAILED ACTION

Election/Restrictions

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 2, and 5 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 2 recites the limitation "said housing(s), said air distribution system" in line 4/5, "said electrical heater" in line 6, "said internal construction" in line 7, "said inlet cavity and said orifice chamber(s) in line 8/9. There is insufficient antecedent basis for this limitation in the claim.

Claim 5 recites the limitation "the axial length of said housing" in ***. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5 are rejected under 35 U.S.C. 102(b) as being anticipated by Hoffman, Jr. et al. (US 5937535).

Art Unit: 3742

Hoffman Jr. et al. discloses a forced air drying unit comprising a housing, an inlet cavity, a baffle, air passages, a single or multiple orifice chamber, and a series of orifices allowing air to pass from said orifice chamber to the exterior of the housing, an electrical cartridge heater mounted within the housing, and having a means for controlling the temperature of the material comprising thermocouple.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Van Denend (US 4756091) discloses a drying device similar to applicant's invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thor S. Campbell whose telephone number is 703-306-9042. The examiner can normally be reached on Tue-Fri 5:30AM-4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Teresa Walberg can be reached on 703-308-1327. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9302 for regular communications and 703-872-9303 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0861.

TSC
January 22, 2003



THOR CAMPBELL
PATENT EXAMINER